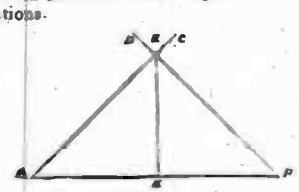
termine, whether they may not introduce them with effect and advantage in their daily avocations.



Let it be required to bisect the right line A B.

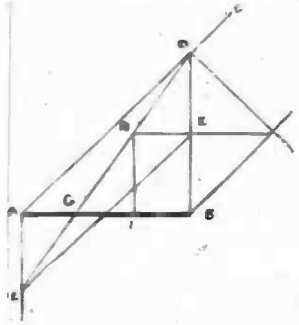
By the edge of No. 3, draw the lines A C and B D, which will intersect in E; lastly, draw the line E F, and the line A B will be bisected in F.

In this operation, as A C and B D are equally inclined to A B, A E B is an isoceles triangle; and as E F is drawn from the vertex, at right angles to A B, it divides the triangle A E B into two equal right-angled triangles; consequently A F = F B.

From this illustration it will at once appear, that we might further proceed and bisect the parts A F and F B; and by following out the process, A B may be divided into 2, 4, 8, 16, &c., equal parts. This operation may be performed by any of the right-angled triangles.

We shall give another example as executed by No. 3.

Let it be required to trisect the right line A B.



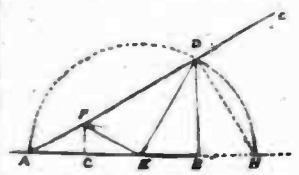
By one edge of No. 3 draw the line A C, and from A and B draw parallel lines at right angles to A B, on contrary sides of it, the line from B to meet A C in D; then bisect B D in E by the former rule, and from E draw the line E F parallel to C A, join D F intersecting A B in G and the line from E parallel to B A in H; lastly, from H draw the line H I parallel to D B, then will A G = G I = I B.

In this operation, as B D and A F are parallel, the line D F intersecting A B in G, forms two similar triangles F G A and D G B; and D B being bisected in E, and A F being parallel to D E, it is also equal to D E; and F A : A G : : D B : B G, but F A = ½ of D B, so that A G = ½ of B G. Again, as the line G D is bisected in H, and H I being parallel to D B; D G : G B : : H G : G I, but D G = 2 H G, so that G B = 2 G I, or G I = I B: and as A G = ½ of B G, it is also = G I = I B.

This method will be found extremely useful for dividing lines into 5, 7, 11, 13, &c. equal parts; for by dividing the line B D into a number of equal parts, one less than it is required to divide the line A B into; then by following the same process already explained, the result will be correctly determined.

Having stated that No. 5 may be conveniently applied in trisecting lines, we shall give one illustration.

Let it be required to trisect the line A B.



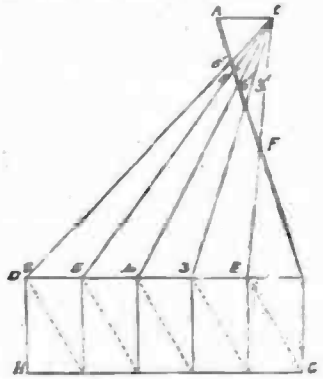
By one edge of No. 5 draw the line A C, and from B the line B D, again from D draw the line D E; E B = ½ of E A; bisect A E by the first rule in G, then will the line A B be trisected in G and E.

In this operation, as the angle C A B = 30°, and A B D a right angle; the line D E being placed so that the angle D E B = 60° = 2 ∠ C A B, E may be conceived to be the centre of a circle, and E D, E A radii; by producing A B, and describing a semicircle from E with the radius E A or E D, meeting A B produced in H, then by joining D H, D H E becomes an equilateral triangle, and it is divided into two equal right-angled triangles by the line D B; consequently E B = B H, and as E H = E A, E B = ½ of E A; and E A being bisected in G by a former rule, A G = G E = E B.

By combining this with the first method of bisecting lines, we might proceed to divide any right line into a great number of equal parts.

As it is frequently required to determine a fractional part of a line, the following method cannot fail to satisfy those who have hitherto been accustomed to use their compasses for this purpose.

Let it be required to determine the ¼, ⅓, ⅖, ⅓, &c. of the right line A B.



From A and B draw the lines A C and B D parallel to each other, and inclined in any degree to A B, on contrary sides of it; mark off A C any convenient length, and on B D set off B E = A C, join C E intersecting A B in F, then will A F = ½ of A B: from E draw B G at right angles to D B, and from B by the edge of any of the triangular instruments draw E G, and from G draw G H parallel to B D, and from E draw E 2 parallel to B G, and 2, 3, parallel to G E; proceed in this manner to determine any number of points in B D, as at 3, 4, 5, 6; join C 3 intersecting A B in 3', A 3' = ⅓ of A B; join C 4, intersecting A B in 4', A 4' = ¼ of A B; join C 5, intersecting A B in 5', A 5' = ⅕ of A B; join C 6, intersecting A B in 6', A 6' = ⅙ of A B; by this simple process, may any fractional part of a line be correctly determined; and it will be much shortened by using one of the improved drawing scales described in number 20 of THE BUILDER; in order to plot off the requisite number of equal parts on the line B D, and that on A C.

In this operation, it will be perceived that as A C and B D are parallel, and A C = B E; the line C E forms two equal triangles, A F C and B F E, and as the angle C A F = E B F, so A F = B F = ½ of A B. Again, as G H is parallel to B D, and 2 3 parallel to G E; E 3 = G 2 = B E, or 3 B = 2 C A, and joining C 3 the line forms two similar triangles, A 3' C and B 3' 3; and as C A : A 3' : : 3 B : B 3', and as C A = ½ of 3 B, so A 3' = ½ of B 3' = ⅓ of A B: in the same manner may A 4' &c. be shewn to be equal to the ¼ &c. of A B.

We might give numerous examples of the utility of this useful set of instruments, but trust that these will be sufficient to stimulate many of our readers to endeavour to apply to them all the purposes named in the former part of this article: it therefore merely remains to allude to the advantages that will result by using them whilst engaged in any of the various systems of drawing.

In the first place, by employing these instruments there will be no occasion to use the hair-spring compasses, in order to divide right lines into any number of equal parts; and in many cases, their use will be avoided even in dividing circular arcs; in fact, the compasses should seldom be employed, except in describing circles and circular arcs; for it must be distinctly understood, that by operating with the triangular instruments no punctures are ever made in the surface of the drawing, and when it is requisite to describe circles from one centre, in many instances there will be no occasion to prick the drawing; for by placing a piece of thin transparent horn over the given centre, the compass point may be placed as correct as if it actually was placed in the real centre; by describing circles in this manner, the surface of the drawing will present an appearance which is seldom to be seen, and will in all cases add much to the effect, from whatever position it may be viewed.

Mechanical and engineering draughtsmen will find these instruments extremely useful for drawing parallel lines, and in describing squares, hexagons, and octagons, as small as they ever have occasion to form them. It was for the latter purpose that our correspondent, Mr. J. Smith, was induced to arrange his first set in 1834, so that he might the more readily execute the plans and elevations of several complicated machines.

Architectural draughtsmen will also find them equally useful for the purposes already named, and particularly whilst engaged in drawing the flutes of columns in the Doric, Ionic, Corinthian, and Composite orders.

Building artificers, cabinet makers, house decorators, and all who have occasion to design patterns of plane or ornamental work will be surprised to see the endless variety of outlines which they may speedily devise by these simple instruments.

We should have had great pleasure in explaining the methods of applying a few of the instruments in isometrical drawing; but as so few draughtsmen have had an opportunity of unravelling the principles of the art, we must patiently await a more favourable opportunity, in hopes that our proposed illustrations will be fully understood by the generality of our readers.

[By way of note, for the information of such of our readers as are not acquainted with certain abbreviations or signs used in the foregoing article, we take occasion to observe that the sign = signifies equal to; and in the case of FA : AG : : DB : BC, the dotted signs make the line read thus—FA is to AG as DB is to BC; the third sign made use of is the expression of an angle, thus ∠.

In the definition of the triangles, ° signifies degree, ′ minute.

We have ascertained the cost of a set of triangles to be 2s., but as they weigh 1½ oz. it will require 2s. 3d. to be forwarded to secure there transmission by post: we can only add that we shall be happy in being instrumental in so forwarding them to any parties in the country upon such remittance, or in otherwise assisting parties to become possessed of the implements.—ED.]

WARMING AND VENTILATION.

TO THE EDITOR OF THE BUILDER.

SIR,—I am sorry to find in THE BUILDER of last week that Mr. Hope misunderstood my statement respecting the imitation of my ventilation plan in Whitecross-street Prison. I therefore feel called upon to disabuse the public mind, and more especially that of Mr. Hope, of any misapprehension of my meaning in protecting my science and the public against *ignorant* imitators.

Mr. Hope is very much mistaken in supposing that I meant to include him in that class, or that I myself belong to such a grossly ignorant and illiberal class of men as they who regard the working classes as inferior beings to themselves. I am sufficiently versed in both ancient and modern history, as well as in the biography of the wisest, most useful, and best of men, who have done honour to their species in all ages and I have myself had sufficient *practical* experience in the world, to know that true philosophers have never allowed their self-esteem to be so inordinate as to betray them into a sneer of contempt for any brother less learned, less fortunate, or less wise than themselves, although the "creative power" may have furnished them with comparatively superior faculties. I have been long satisfied that they who scornfully regard those really *practical* men, the labouring or truly productive classes, contemptuously shunning their society, or heedlessly spurning their opinions, are totally unworthy of that most noble though modest designation, philosopher, wise man, or lover of science; and the public may rest assured that they come not under that most estimable denomination, but are barely men, being distinguishable only as copyists, for good memory, and the imitative faculty.

The principle of ventilation introduced into Whitecross-street Prison was not with warm, but only with atmospheric air, through a chamber below

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